

Interpreting Sheepskin Effects of Investment in Schooling

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Abstract

In the last few years, significant amount of research has produced evidence in support of the signaling, credential or “sheepskin” effects in rates of return to schooling for studies of the developed as well as developing countries. An example of the former is the seminal empirical work by Hungerford and Solon (1987) as well as more recent research for the U. S. [Park (1999) and Flores-Lagunes and Light (2007)] and other developed countries [Mcguinness (2003) and Antelius (2000) for Europe, for instance, and Bauer et al. for Japan (2004)]. Examples of such work for developing countries include Shabbir (1991) for Pakistan, Schady (2003) for the Philippines, and Mora (2008) for Colombia.

Testing the sheepskin or credential hypothesis is tantamount to ascertaining if the marginal rate of return to education increases discontinuously for the years when completion diplomas (or degrees) are awarded to the individual.

Despite the existence of sheepskin effects, very few attempts have been made either for developed or developing countries to specifically try to identify the possible channels by which such effects may exert themselves. Notable exceptions are Flores-Lagunes and Light (2007) for the U. S. and Riddle (2008) for Canada. This paper tries to address this neglected yet important question by empirically exploring this question in the case of Pakistan.

Specifically, this paper explores the above question of interpretation of sheepskin effects in the case of Pakistan. Using the IFPRI-sponsored, 1987 Pakistan Survey of Rural Education, Migration and Employment (PSREME), it tests the hypothesis whether observed sheepskin effects are signaling individual innate ability and/or family background. Thus understanding more fully the sheepskin mechanism, will allow us to better appreciate the role of schooling and degree completion in determining earnings.

According to the results of this paper, the sheepskin effects prove to be robust both to an inclusion of measures of innate ability as measured by Raven Progressive Matrices and

‘cognitive’ ability that is based on specially administrated tests of literacy and numeracy as well as measures of family background.

This is an important finding with significant policy implications for the debate on the social vs. private returns to schooling investments. The present paper shows that the sheepskin effects as observed in this sample are particularly robust and are not mediated via individual’s innate ability as measured by the Raven Progressive Matrices or measured family background. Thus we will need to continue to explore the exact mechanism that underlies the sheepskin effects which in itself has significant analytical as well as policy implications.

Keywords: Human capital investments, Returns to education, Sheepskin effects, Developing countries, Pakistan, Family background, Ability, Earnings.

1. Nature of the debate: Do Sheepskin Effects exist?

One important dimension of the longstanding interest in the economic effects of schooling has been the question regarding credential or the sheepskin effects¹. The observed positive correlation between the labor market earnings of individuals and their years of completed schooling is a widely noted stylized fact. While explanations abound, the standard interpretation of this phenomenon is that of the human capital school which considers this correlation (with appropriate controls for labor market experience) as being consistent with its view that increments in education enhance worker productivity which is essentially then reflected in higher observed earnings. One of the significant challengers to this productivity-enhancing thesis about the impact of education is the ‘screening’ theory which contends education to be merely (or, at least, mostly) a signaling device for the pre-existing abilities that are valued by the employers (This may also be referred to as sheepskin hypothesis). Thus, the proponents of the screening view argue that the higher earnings of the relatively more educated really reflect a premium for these inherent individual aptitudes and behavioral characteristics. After all, successful completion of a prescribed amount of schooling necessary to obtain a degree signifies a certain amount of discipline, perseverance and goal-orientedness relatively scarce characteristics that are useful in the world of work. One important implication of this view is that degree completion or sheepskin effect may be simply masking innate ability. These opening views about the impact of education have been well described in the literature: see, for instance, Becker (1964) and Mincer (1974) for the human capitalist view and Arrow (1973) and Spence (1974) for the screening view.

Both for theoretical as well as public policy considerations, it is important to determine whether the productivity-enhancing or the sheepskin view of education is more sound. In terms of public policy, these opposing views have quite different implications for the relative private and social costs/benefits of investment in education. Of course, these considerations are particularly important for the developing countries where any misallocation of resources is especially costly due to a relative scarcity of funds.

¹Webster’s Dictionary characterizes ‘sheepskin’ as a colloquial word that refers to ‘a diploma, sometimes made of parchment (the skin of sheep etc., prepared for use as a writing material)’. In this paper, diploma, degree, and certificate will be used interchangeably to represent formal evidence of completion of a course of study.

However, distinguishing between the human capital and screening theories on the basis of empirical evidence is complicated by the fact the data on any explicit skills tests which may measure increments in human capital are generally not available. Nevertheless, since the sheepskin hypothesis is considered as one of the testable predictions of the screening theory, testing it is often considered as an indirect way of resolving the above debate. In the words of Riley (1979), the sheepskin hypothesis predicts that “wages will rise faster with extra years of education when the extra year also confers a certificate”.

In the last few years, significant amount of research has produced evidence in support of the sheepskin effects in rates of return to schooling for studies of the developed as well as developing countries. As examples of the former are seminal empirical work by Hungerford and Solon (1987) and more recent research for the U. S. [Park (1999) and Flores-Lagunes and Light (2007)] and regarding other developed countries, consider for instance, McGuinness (2003) and Antelius (2000) for Europe, and Bauer et al. for Japan (2004). Examples of such work for developing countries include Shabbir (1991) for Pakistan, Schady (2003) for the Philippines, and Mora (2008) for Colombia.

However, despite finding significant sheepskin effects, few of these existing studies try to empirically investigate the exact mechanism by which these effects work. Theoretically, it has been conjectured that they may reflect such factors as native ability [Arrow (1973)], demonstrated discipline, goal-orientedness and perseverance to finish a prescribed program or even 'socialization' i.e. development of non-cognitive, affective ability which makes for a good employee (Bowles and Gintis (1976). These characteristics might then be expected to be correlated with family background, home environment or perhaps a different set of factors altogether.

Also, in terms of relevant empirical studies, there has not been much work investigating the mechanism of the observed sheepskin effects. However, a few notable exceptions have started addressing this important yet neglected question of interpreting what do sheepskin effects signal? For the U. S., see Flores-Lagunes and Light (2007), for Canada, Riddle (2008) and for Pakistan see Shabbir (2011) which explores the relative impact of native vs. cognitive ability as possible explanations for the observed sheepskin effects in the case of Pakistan.

1.1 Existence of Sheepskin Effects for Pakistan.

Even though the screening theories and its sheepskin variant have figured prominently in the debate about the effects of education for several decades and despite the fact that this debate is currently enjoying a renewed interest both for the developing as well as the developed countries, there are few existing studies that specifically focus on testing the sheepskin hypothesis for Pakistan. One reason for this paucity of studies for Pakistan may have been a lack of appropriate data on an individual's educational status. As discussed further in the data section of the present paper, for most of the available micro level surveys (e.g. HIES), the individual's education is reported not as years of completed schooling but rather as a discrete variable whose form does not allow testing of the sheepskin effect. For one, this sample questionnaire structure implies a lack of precise data about the number of years of schooling completed by those who do not complete the relevant degree. This is a very common data deficiency which makes the few samples such as the one used in this paper where years of schooling is available as a continuous variable a relatively rare opportunity to test the sheepskin hypothesis. Incidentally, by and

large, the studies for Pakistan such as Khan (2008), Awan and Hussain (2007) and Nasir(2002) do not have continuous years of schooling data available even though at least one of their stated goals is to ascertain sheepskin or credential effects of schooling.

In terms of the specific studies of the sheepskin effects of education, the situation for other developing countries is somewhat better than that of Pakistan as there is evidence of substantial interest in this important area. For developing countries in general, amongst the earlier studies supporting sheepskin hypothesis are by Van Der Gaag and Vijverberg (1989), King (1988) and Shabbir (1991) while more recent work for developing countries is Schady (2003) for the Philippines and Mora (2008) for Colombia.

As against the situation for the developing countries, considerable work has been done on testing the sheepskin hypothesis for the developed countries. One of the significant examples is the Belman and Heywood (1991) study of sheepskin effects of education for minorities and women in the U.S. It builds on the seminal study for the U.S., Hungerford and Solon (1987), which presented strong evidence about “substantial and statistically significant” sheepskin effects for a sample of male earners in the U.S. and maintained that some of the earlier studies such as by Layard and Psacharopoulos (1974) may have prematurely ‘dismissed screening theories of education partly on the ground that diploma years of education do not confer especially large earnings gains.’ Other recent studies for the U.S. confirming the existence of sheepskin effects include Park (1999) and Flores-Lagunes and Light (2007).

1.2 Interpreting the Sheepskin Effects for Pakistan

As discussed above, the two relevant questions are (i) existence of sheepskin effects of schooling investment and (ii) if so, what do they represent? They may represent any number of influences such as innate ability, cognitive skills or ability, family background or myriad other influences that may in theory make for a possible consistent explanation for the existence of the labor market premium for degree completers relative to dropouts. However, this exploration into the interpretation of the observed sheepskin effects has not been explored much for all countries in general and specifically for Pakistan.

The objective of this study is to make use of the International Food Policy Research Institute (IFPRI) 1987 sample of rural Pakistan to ascertain how much of the increase in an individual’s post-schooling earnings is due to the human capital type of productivity-enhancing effects as against the sheepskin effects. Further, in the case of observed sheepskin effects, we need to ascertain if they are independent of a person’s ‘ability’ and family background as measured by parental schooling, occupation, and person’s gender and region of residence.

The rest of this paper is organized as follows:

Section 2 presents the proposed methodology as well as empirical specification while Section 3 describes the data. Section 4 reports the empirical results. Finally, Section 5 contains conclusions as well as policy recommendations.

2. Methodology

Testing the sheepskin hypothesis is tantamount to ascertaining if the marginal rate of return to education increases discontinuously for the years when completion diplomas (or degrees) are awarded. The proposed methodology to do so essentially involves a re-specification of the traditional human capital earnings function given by Mincer (1974).

In fact, a good starting point for our discussion would be this ‘Mincerian’ specification where, as is well known, (natural) logarithm of individual earnings ($\text{Ln}Y$) is posited to be a linear function of years of completed schooling (S), labor market experience (EXP) and its square. In the present context, however, it would be convenient to suppress the experience term: thus, the shortened Mincerian earnings function can be written as follows:

$$\text{Ln}Y = \alpha + \beta_1 S(1)$$

The important point regarding (1) is that the marginal rate of return to schooling, $\partial \text{Ln}Y / \partial S = \beta_1$, is constant. In effect, this implies that all years of schooling are ‘created equal’ in return of their marginal impact on log earnings. In particular, there is no ‘premium’ or ‘bonus’ rate of return if the marginal year of schooling marks the completion of a degree/diploma¹¹.

In order to test for the possibility that the return to education increase discontinuously in diploma years (i.e. the sheepskin effect exists) we take the following approaches:

- (a) we generalize the human capital linear specification (1) to allow for discontinuities at values of S which correspond to award of degrees and
- (b) we specify $\text{Ln}Y$ to be a step function of S which a separate step for each year of completed schooling and the ‘step size’ for diploma years is compared with that of the years of schooling leading up to the diploma.

In the discussion that follows, Model I corresponds to approach (a) while Model II corresponds to approach (b) above. In order to further elaborate these approaches let us discuss them in turn.

First, in order to elaborate approach (a) let us suppose that there are only two diploma year’s corresponding respectively to five and ten years of completed schooling. Define $D5$ and $D10$ as two dichotomous (0,1) variables such that $D5 = 1$ if $S \geq 5$ and $D10 = 1$ if $S \geq 10$.

Model I: “Dummies for Degrees”.

In this case, the relevant discontinuities are allowed for by simply adding the dummy variables $D5$ and $D10$ to the traditional human capital function. The following equation represents Model I.

$$\text{Ln}Y = \alpha + \beta_1 S + \beta_2 D5 + \beta_3 D10 \quad (2)$$

Then, significantly positive regression estimates of $D5$ and $D10$ would imply sheepskin effects. Also note that for every n diploma years, the graph of $\partial \text{Ln}Y / \partial S$ gets divided into $(n+1)$ ‘segments’ over the domain of S . In case of equation (2), the three relevant regimes defined over the domain of S are given by $0 < S < 5$, $5 < S < 10$ and $10 < S < \infty$ [See Figure (1a’)]. The relevant marginal “rates of return”, r , over the domain of S are given as follows:

<u>Years of Completed Schooling (S)</u>	<u>Rate of Return (r)</u>
S<5	β_1
S=5	$\beta_1 + \beta_2$
5<S<10	β_1
S=10	$\beta_1 + \beta_3$
S>10	β_1

Model II: Step Function.

For purposes of exploring the relationship between schooling and earnings for possible diploma effects, the final specification of interest is the so called ‘step function’. In this case, no restrictions are imposed on the earnings-schooling profile --- the log of an individual’s earnings is treated as a ‘step function’ of years of completed schooling with a separate step for each year. For K years of completed schooling, such a specification can be represented by equation (3) which is given below.

$$\ln Y = \alpha + \sum \beta_i S_i \quad (3)$$

Here each S_i is a (0,1) dichotomous variables where $S_i = 1$ if $S = i$ and $i = 1, 2, \dots, K$.

The estimated regression coefficients β_i can be used to calculate the implied step size in terms of the ‘marginal’ rate of return to an additional year of schooling. Thus, in order to evaluate the potential sheepskin effects, the step size for the year conferring a particular diploma can be compared with the step size corresponding to each of the years leading up to that diploma.

Accounting for Ability as well as Family background

A vector, X, of variables measuring ability (Cognitive as well as innate) and family background (parental schooling, occupation and region of residence of the person) can be added to the specification as given in equation (2). Thus consider the following more complete versions of specifications (2) and (3) above to obtain (4) and (5) below.

$$\ln Y = \alpha + \beta_1 S + \beta_2 D5 + \beta_3 D10 + \gamma X \quad (4)$$

$$\ln Y = \alpha + \sum \beta_i S_i + \gamma X \quad (5)$$

Thus there are two sets of empirically testable questions. Do sheepskin effects exist and if so what do they represent?

3. Data Description

The empirical results of the present study are based on the 1987 Pakistan Survey of Rural Education, Migration and Employment (PSREME) which was conducted as part of the 10th round of a panel survey of about 800 rural households in Pakistan which has been undertaken by the International Food and Policy Research Institute (IFPRI) under the auspices of the Pakistan Ministry of Food and Agriculture. This multi-purpose micro-level household panel survey has been conducted approximate quarterly since 1986 and it

collects information on personal and household socio-economic characteristics for over 7000 individuals drawn from villages in two districts (Attock and Faisalabad) of the Punjab (Badin) of Sind.² While these sample districts were not completely randomly chosen, however, within each district the villages and households were based on random sampling.³

Besides information regarding individual's salary/wages, employment status, years of complete schooling, the PSREME contains valuable information about the individual's background characteristics such as parental schooling and scores on measures of 'nature ability' as well as of the 'cognitive skills' that are produced as a result of schooling.⁴ The PSREME is particularly valuable for the present study since it offers a rather rare opportunity to test the credential proposition for Pakistan as it is amongst the few relevant micro-level surveys for the country that report the individual schooling as a 'continuous' variable rather than the norm of 'categorical' variable.⁵

In order to obtain the sample used in the present study we selected male plus female wage earners or salaried employees with years of schooling, $S \geq 0$ and natural logarithm of monthly earnings, $\ln Y > 0$. In this manner, we obtain a primary sample 276 individuals. As a matter of fact, Table 1 provides the acronyms and a brief description of the variables for the sample used in this study.

4. Empirical Results

The empirical estimates for this paper are given in Tables 2 through 8. These results for our sample of rural Pakistan enable us to test the two alternative i.e. sheepskin vs. productivity-enhancing hypotheses regarding the effects of schooling on individual earnings as well as entertain the follow-up question of interpreting any evidence of the sheepskin effects.

Regarding Table 2, its first column contains the most fundamental Human Capital (HC) specification which is due to Mincer (1974) while the next three columns represent

²The sample does not cover Pakistan's fourth Province, Balochistan which incidentally contains only a small proportion of the country's rural population.

³ In fact, according to Pasha and Hasan (1982), Attock, Dir and Badin are ranked as the poorest districts in their respective provinces; Faisalabad, a relatively prosperous district in Punjab was selected as a control. For further details on sample selection, see Sabot (1989) or Malik and Farooqi (1993).

⁴ For a thorough discussion of the nature and appropriateness of these tests as measures of latent ability see Khan (1993) and for a related discussion see Malik and Farooqi (1993).

⁵ The various Household Income and Expenditure Surveys (HIES) for Pakistan could have been a potential source of nationally representative survey to test the credentials vs. human capital hypotheses but unfortunately they report schooling as a discrete variable with possible response as 'Primary but less than Middle' and 'Middle but less than Matric' rather than as a continuous variable representing exact years of completed schooling. This precludes the use of HIES for testing sheepskin hypothesis since they fail to meet the necessary condition that we should be able to distinguish those who complete a course say, Primary or Middle and stop there from those who start the next level but dropout.

estimates for a Pure Credentials (PC) model. The distinguishing feature of the two specifications is the manner in which schooling is hypothesized to affect (natural logarithm of) individual earnings, the dependent variable. In the case of human capital or Mincerian specification, all units of schooling are implicitly assumed to be 'created equal' in the sense that the marginal rate of return to schooling is constant over the domain of S. In particular, the additional year of schooling that may mark the completion of a degree has no particularly unique effect. On the other hand, the Pure Credentials (PC) specification implies that only completed degrees matter. In terms of the empirical evidence, as can be seen from column 1, all coefficient estimates for the HC model are significant at 95% level which is consistent with the Mincerian view. Note that the coefficient estimate for S implies a marginal rate of return to schooling of 6% while the positive coefficient estimate of EXP and a negative coefficient estimate of the squared EXP term implies 'concave' experience – earnings profile. Finally, the coefficient for the dummy variable FEMALE indicates significant wage discrimination against the females.⁶ In any event the HC specification as estimated in column 1 is to be treated as the 'reference' point or bench mark specification against alternatives we wish to consider.

With this perspective, let us now consider the results for the Pure Credentials (PC) model as presented in columns 2 through 4 of Table 2. It is very interesting to note that, in general, these results show positive and significant coefficient estimates for completed primary (D5) and completed matric (D10) while there are positive (but not significant) coefficient estimates for the two other degree levels i.e. Bachelor's (D12) and Master's (D14).

Also, note that compared to the HC model, the PC model explains marginally more of the variance in the dependent variable since adjusted R^2 is 0.15 for column 3 vs. 0.14 for column 1. However, it would be useful to see if the significantly positive coefficient estimates for diploma effects would persist if we also include S or years of schooling in the specification. Most interestingly, as can be seen from the regression results in Table 3, it turns out that the coefficient estimate of S is not significantly different from zero while the diploma dummies, especially for D5 and D10 retain their significance and are positive. This is strongly indicative of diploma or sheepskin for schooling in our sample. Incidentally, in Shabbir (1991) an earlier sheepskin effects study for Pakistan, it was found that for a nationally representative sample, the coefficient of S (albeit still significant) was reduced by almost 50% and strong diploma effects existed there too.

In any event, in Table 4 we present empirical results for still another specification which can shed light on the question of the sheepskin effects of schooling. This is the so-called step function specification which imposes no restrictions on the earnings-schooling profile --- the log of an individual's earnings is treated as a 'step function' of the years of completed schooling with a separate step for each year.⁷ Quite importantly, note that the table reports positive coefficient estimates as well as the implied step sizes for the 5th, 10th, 12th, and 14th year of schooling. While the above coefficient estimates are significant at the 95% level, the implied step size are so only at the relatively weaker

⁶ However, the results for females should be at best treated as indicative only since there are only 11 females in the sample of wage earners.

⁷ Except for the 9th, 11th, and 13th year of schooling for which we have no observations in our sample.

level (for the 5th year, it is significant at the 90% level for 1-tailed t-test while for S=10 it is significant at 95% level for the same t-test). What do these results tell us about the sheepskin effects of schooling? Essentially, the results are supportive of the evidence reported in Table 2 and Table 3. However, since the sample size is relatively small causing the data to thin out or be missing for many cells i.e. school years, the precision of the implied step size estimates may have been somewhat adversely affected. However, as reported previously, an earlier study, Shabbir (1991), which used a much larger and nationally representative data set, reports positive and significant step sizes for the 8th, 10th, and 12th years of schooling implying strong evidence in favor of the sheepskin of schooling in Pakistan.

To summarize the discussion so far, for the present sample, the strongest evidence in support of sheepskin hypothesis is reported in Table 2 and Table 3.

Let us now turn to the second set of empirical issues namely how to interpret them? What do these observed sheepskin effects signal? This is an important yet relatively neglected aspect of such studies. We are able to empirically test whether these observed sheepskin effects represent (a) native and/or cognitive ability and/or (b) family background effects.

(a) Do Sheepskin Effects signal innate and/or cognitive ability?

Since diploma effects are sometimes hypothesized as arising due to demonstrated ability to persevere and complete a given ‘project’, it would be interesting to see if these effects are robust to the explicit inclusion of certain measures of ability in the earnings function specification.

For the present sample, RAVEN is purportedly a measure of the ‘natural’ or innate ability while COGNITIVE is a score on a test of cognition which is produced as a result of schooling.⁸ Table 5 contains results when COGNITIVE alone is added to the specification⁹ while Table 6 presents results when both COGNITIVE and RAVEN are made a part of the specification. The results are indeed quite interesting on several counts.

First, note that across the different specifications given in Table 5, COGNITIVE is not significantly different from zero.¹⁰ However, the diploma effect as measured by the coefficient estimate of D10 (Matriculation) is robust at the 95% level whereas those for D12 and D14 are positive but not significant.¹¹ Similarly as given in column 4, the step function still exhibits significant and positive coefficient estimates at the 10th (Matric), 12th (Intermediate) and the 14th (Bachelor’s) years of schooling which correspond to important diploma levels.

⁸ See Sabot (1989) for additional information on the nature of these tests.

⁹ When we include COGNITIVE in the specification and use list wise deletion of missing variables.

¹⁰ The fact that in the HC specification, the coefficient estimate for COGNITIVE is not significant while that of S is still significant is very interesting as this fact considerably weakens COGNITIVE’s claims as a possible measure of schooling’s output.

¹¹ Incidentally, note that since COGNITIVE was administered only to those with a minimum age of 10 years and 4 years of completed schooling as a result the sample loses all observations for D5.

Finally, as can be seen from the results reported in Table 6, when in addition to COGNITIVE we included RAVEN, its coefficient estimate is not significantly different from zero in any of the specifications while the rest of the results are qualitatively the same as discussed for Table 5.

Thus based on the results of the above two tables, an interesting observation is that even when we control for these measures of ability, diploma effects for the PC version do not disappear (see 2nd columns of Tables 4 and 5). While it is true that coefficient estimate of S is significant in the presence of these ability measures (Column 1, Table 5), when both S and diplomas are included as in Column 3, Table 5, the S coefficient loses its significance. While in this case column 3 provides only minimal indication of sheepskin effects, relatively speaking, the results in column 2 and column 4 indicate relatively strongly that the sheepskin effects are robust to inclusion of these ability measures.

(b) Do Sheepskin Effects signal family background?

In relation to the diploma effects that we have noted earlier, another important question arises as to what do they signal? Besides ability or perseverance to finish stipulated programs of study, they may be merely reflecting family's social contracts or, more broadly, home environments of the individuals. In fact, a few studies for other countries report that when family background is controlled for in the human capital or Mincerian type of earnings function it leads to significant changes (often reductions) in the estimated coefficients of years of schooling. We are interested in exploring whether the same is true for the sheepskin effects that we have noted.

Table 8 presents the results for different specifications once we control for family background. In the present study family background is measured by father's education, father's income and mother's education¹². Generally speaking, across the four specifications only the coefficient estimate of 'father being matriculate' (FEDMAT) is fairly large, positive and significant at the 90% level in column 3 – the specification of special interest to us. The coefficient estimates of father's occupation are positive for most of the cases but generally their significance level is low. In any event, while the coefficient estimates of these measures of family background could be of considerable interest in themselves, presently the most important result is that the diploma effects stay positive and significant for D5 and D8 (see column 3) as are the step function coefficients for S5, S10, S12, and S14. These results imply the robustness of diploma effects even when family background is controlled for indicating that they signal a phenomenon which is distinct from the effects of home/family environment.

(c) Interprovincial Heterogeneity

The across-province-variation in the parameters of earnings functions may be expected on several counts. For one, spatial heterogeneity of labor markets and variation in ethnicity based cultural norms may act as impediments to free mobility of workers. Also, inter-provincial differences in allocations of public funds can lead to significant differences in labor market related information flows as well as access to schooling. The latter factor by indirectly affecting labor market opportunities can constrain worker

¹²How best to account for family background influences is subject to some debate. This may, in part, be due to the fact that certain aspects of the family background such as the home environment or endowments may be unobserved.

mobility. Thus it may be important to evaluate the robustness of diploma effects across provinces.

Table 8 provides results for the case when possible inter-provincial variation has been controlled for by introducing (0,1) dummy variables for the Punjab and the Sind provinces (the NWFP province is the excluded category).

Interestingly, none of the coefficient estimates for PUNJAB and SIND are significant across the different specifications presented in Table 4. In particular, note the diploma effects stay robust even when we have introduces controls for the different provinces represented in the sample.

5. Conclusion and Policy Implications

(a) Main conclusions

The main conclusion of the study is that there are ‘bonus’ increases in marginal rates of returns to schooling for important diploma levels such as completed Primary, Matriculation, Intermediate and Bachelor’s degree for wage earners. These empirical results are generally consistent with the sheepskin or credentials view thus lending support to the screening rather than the human capitalist view of the impact of schooling. This finding is qualitatively similar to that of Shabbir (1991) which used a nationally representative sample of Pakistan to test the same hypotheses. Interestingly, these diploma effects stay generally robust even when we control for an individual’s native as well as cognitive ability, family background and provincial heterogeneity.

Regarding the above result, a noteworthy caveat is that the positive coefficient estimates of the premiums on diplomas are often but not always significant – the latter most probably due to the relatively small size of the sample. Thus whereas we are reminded of the need to try to replicate these results using larger samples, we should not lose sight of the fact that the present sample is amongst the very few relevant micro level data sets which report education as a continuous variable – a necessary condition for testing the credentials hypothesis in the first place.

(b) Implications for Public Policy

Firstly, the relatively strong evidence in favor of the significant (albeit not exclusive) role of credentials or presence of sheepskin effects provides insights regarding the optimal public resource allocation for the education sector. The results from this sample for rural Pakistan strongly suggest that one has to be careful in not overstating the ‘productivity-enhancing’ role of schooling. Apart from possible information transmittal role via signaling, dominant credential effects imply large private but relatively small social benefits of investment in schooling. If additional empirical support for such effects persists, it would indicate the need for a somewhat balanced or even restrained commitment of public resources to education. Besides having implications for the inter-sectoral allocation decisions, the nature of the credentials effects may also imply that intra-sectorally, relatively more of the public funds should be allocated to those levels of schooling where credentials effects are relatively weaker (such as for primary and tertiary vs. the higher education levels).

Secondly, since one of the important implied findings of the study is that there is a very high premium on completion of a given degree level, dropping out should be minimized. Of course, the losses from dropping out are primarily private if the sheepskin hypothesis

holds; otherwise, they also include social costs due to the societal disinvestment in productivity-enhancing skills.

Thirdly, besides the primary policy implication that dropping out should be discouraged, the study also sheds light on the labor market effects of family background and home environment as measured by parental education and occupational status. Our results imply that family background may have little direct bearing on individual earnings. However, the study has cited evidence that family background measures have important direct effects on years of completed schooling so that improving home environment for children can be a positive intervention.

Fourthly, the study finds evidence of significant wage discrimination against females even though there are few observations for them. This evidence of gender discrimination should be of concern to policy makers.

Finally, more studies need to be done to add to the really meager empirical evidence on the sheepskin vs. human capital impact on education in Pakistan. In this respect, it is important that national level household income and expenditure surveys should record information on education as a continuous variable which is a necessary condition to test the credentials hypothesis.

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